Goals and Recommendations

GOAL 1: Provide Selected Core Information Resources and Services for Toxicology and Environmental Health

The National Library of Medicine has been at the forefront of making toxicological and environmental health data accessible since the 1960's, when Rachel Carson's *Silent Spring* forcefully brought to the public's attention just how susceptible the environment was to widespread damage. NLM, through its Toxicology Information Program (TIP), has assembled highly useful databases that today are well-established mechanisms to search and retrieve needed information in such areas as toxicology, hazardous materials, occupational and environmental health, and the basic biomedical sciences. (A list of these resources is shown in Figure 1.) If the TIP is to continue to provide useful information resources it needs to undertake programs to strengthen traditional library services, to evaluate the information needs of professionals working in toxicology and environmental health, to refine, expand, and integrate information in NLM databases, and to provide quality indicators for information sources.

1.1 Strengthen Traditional Library Services

The adequacy and extent of "traditional" library services in the areas of toxicology and environmental health, and the need for and use of these services, have never been fully evaluated. It is not known if existing library collections are sufficient, whether methods of bibliographic control—indexing and cataloging—are adequate, how well the established interlibrary loan processes serve the field, or whether existing reference services are satisfactory. For biomedical research and traditional clinical medicine, these functions are carried out within the 3,600-member National Network of Libraries of Medicine (NN/LM). The Panel identified no equivalent systems serving toxicology and environmental health.

How are the "traditional" library service needs of those working in the area of toxicology and environmental health now being met? What resources are available to meet these needs? How are they accessed? Would an employee of a state water pollution control agency know that the information she seeks is in the online Integrated Risk Information System (IRIS)? Or that the article she seeks can be quickly provided through the National Network of Libraries of Medicine? Any assessment of needs must take into

TOXLINE (Toxicology Information Online): Toxicological, pharmacological, biochemical, and physiological effects of drugs and chemicals. Nonroyalty. 1.7 million records.

TOXLIT (Toxicology Literature from special sources): Same as TOXLINE, but derived from royalty sources exclusively. 1.6 million records.

CHEMLINE (Chemical Dictionary Online): Online dictionary of chemicals found in NLM databases and other sources. Royalty. 1.1 million records.

ChemID (Chemical Identification): Online dictionary file of chemicals of regulatory and biomedical interest. Nonroyalty. 277,000 records.

HSDB (Hazardous Substances Data Bank): Toxic effects, environmental fate, safety and handling data for hazardous chemicals. 4,300 records.

CCRIS (Chemical Carcinogenesis Research Information System): Data on chemical carcinogens, mutagens, tumor promoters, and tumor inhibitors. 3,500 records.

RTECS (Registry of Toxic Effects of Chemical Substances): Data on potentially toxic chemicals. 115,000 records.

DBIR (Directory of Biotechnology Information Sources). 1,900 records.

DART (Developmental and Reproductive Toxicology): Bibliographic information on physical agents that may cause birth defects. 12,000 records.

EMICBACK (Environmental Mutagen Information Center Backfile): References to chemical, biological, and physical agents tested for genotoxic activity. 72,000 records.

TRI (Toxic Chemical Release Inventory): Annual estimated releases of toxic chemicals to the environment and amounts transferred to waste sites. 335,000 records.

IRIS (Integrated Risk Information): Contains chemical-specific EPA health risk data and regulatory information. 600 records.

Figure 1
NLM's Current Online Information Resources in Toxicology and Environmental Health

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account the many types of individuals to be served, including physicians and nurses, HAZMAT personnel, emergency medical response teams, toxicologists, and environmental scientists.

Although NLM and the National Network of Libraries of Medicine do meet some of these information needs, the size of that portion is unknown. Moreover, although NLM does try to collect comprehensively published materials in toxicology and environmental health, the Library has never assessed its collection in these areas. The controlled vocabulary used to catalog and index these materials (Medical Subject Headings—MeSH), and the evolving Unified Medical Language

System (UMLS) have never been evaluated for their adequacy in these fields. Nor has there been any assessment of the collecting and archiving policies of the libraries in the NN/LM in this subject area, or of the borrowing patterns among them. In addition, some experts suggest that better bibliographic control of technical reports, state documents, and other elements of the "fugitive" literature is needed.

Recommendation 1.1

NLM should evaluate systematically the adequacy and extent of current library services in order to guide an expansion of its activities in collection building, cataloging, indexing, document delivery, and reference services in the subject areas of toxicology and environmental health. The Library should consider expansion of its MeSH indexing vocabulary and of the Unified Medical Language System (UMLS) project to accommodate these subjects. In addition, NLM should investigate the desirability of expanding its linkage to the several major libraries having substantial collections in these subject areas that are not now members of the National Network of Libraries of Medicine, offer to incorporate them into that network, and expand the network's interlibrary loan activities accordingly.

1.2 Evaluate the Needs of Users for Automated Information Services

In responding to the recommendations contained in *Improving Health Professionals' Access to Information*, the 1989 Planning Panel Report on Outreach, NLM has conducted a variety of successful outreach efforts to establish contact with potential users of its services. A similar effort is indicated to reach those working in toxicology and environmental health, such groups as HAZMAT personnel, emergency medical response teams, toxicologists, and environmental health scientists. Appropriate strategies for this include direct mail and online user surveys, focus groups, and outreach efforts (including exhibits at professional meetings) by the Regional Medical Libraries.

The purpose of reaching present and potential users is to learn on just which information services they place a high priority and where they feel the lack of adequate resources. Evaluating their needs might identify, for example, new elements to be included in NLM's present databases. Or perhaps a need will be expressed to add certain difficult-to-obtain databases to NLM's range of offerings, either by direct dissemination via NLM systems, distribution of databases or subsets to others, use of electronic gateways, or electronic directory listing.

Recommendation 1.2

The NLM should extend its current outreach efforts to those working in toxicology and the environmental health sciences in an effort to ascertain from present and potential

users the value of NLM's current database offerings and the need for additional database elements, components, or services. This effort should become part of a formal evaluation under which NLM periodically reassesses the contents and organization of its suite of toxicology and environmental health databases. NLM should evaluate the information needs of user group categories that may not be well served by current offerings (e.g., practitioners of occupational and environmental medicine). A new user advisory group should provide advice on selection of databases for NLM's systems, and function as a forum for user feedback.

The most difficult challenges for environmental health today come not from what is known about harmful effects of microbial agents; rather they come from what is not known about the toxic and ecological effects of the use of fossil fuels and synthetic chemicals in modern society. Population growth, urbanization, new energy sources, advanced technology, industrialization, and modern agricultural methods have enabled unprecedented progress. At the same time, they have created hazards to human health that are dramatically different from hazards of the past.[2] (Healthy People 2000)
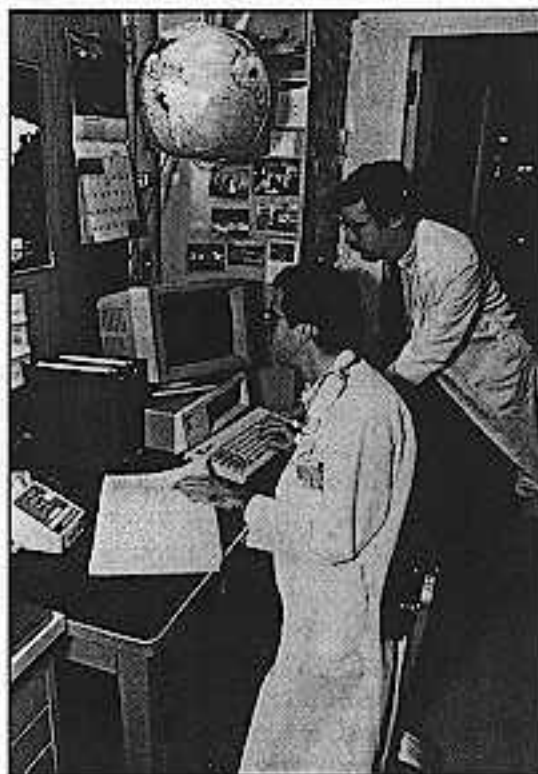
1.3 Refine and Expand Information Elements within NLM Databases

The suite of specialized databases in toxicology and environmental health that NLM now provides has been created *de novo* or acquired from diverse sources. The various databases contain many data elements, some unique, some in common. The evaluation to be undertaken in response to the previous recommendation may uncover inadequacies in these data elements, or may suggest linkages among them that do not presently exist.

The Panel identified a number of broad areas in which NLM should consider developing or enhancing databases. Examples are epidemiology, radiation, community emergency preparedness and response, and molecular medicine. Specific subject areas that appear to be inadequately covered are morbidity and mortality statistics related to environmental health. The user evaluation will no doubt suggest other areas—broad and specific—that require new or expanded information resources. In general, the Panel would expect to see the need expressed for more factual, numeric, and geographic data, in addition to bibliographic information.

Recommendation 1.3

Based in part on the results of evaluation activities recommended above, NLM should develop a plan and a set of priorities for enhancing and expanding its information services to include additional data elements and, when expressly warranted, the offering of new factual, numeric, and geographic databases.

A new user advisory group should provide advice on enhancing and refining NLM databases.

1.4 Integrate Information within NLM Databases

Because NLM's suite of toxicology and environmental health databases has evolved over the years in response to the needs of various agencies and organizations, there is little integration of the contents of the databases. They are built and maintained separately, and usually must be searched by the user one database at a time. In order to overcome this deficiency, however, NLM has begun to develop methods for crossfile searching of NLM databases. The Library should continue this effort, identifying common elements in toxicology and environmental health databases (even though they may derive from completely separate sources), and consider a system (such as a relational database structure) wherein the common elements are represented only once. File management would be more effective, data redundancy would be eliminated, and a variety of new service capabilities could be introduced.

Recommendation 1.4

The contents of NLM's toxicological and environmental health databases should be integrated, where possible, so that they have common data elements, access methods, and indexing methodologies, and a consistent interface and uniform style. The objective is to allow these databases to be searched as a unit and ultimately linked with all MEDLARS databases.

1.5 Label Computer Databases and Information Sources with Quality Indicators

Many of the current NLM databases in toxicology and environmental health take their content from datasets and other information collections that have been created by other organizations. Because of their various sources, such databases are lacking in consistent standards for scope of coverage, selection of individual entries, and contents. Data quality varies from database to database depending on the purposes for which the database was designed. Some databases are collections of carefully evaluated data; others may consist of estimated values. The same will be true for databases to which NLM users in the future might be directed through the electronic directory, pointers and linking systems.

NLM should not pass judgment on the validity of the data in a database, but for each should provide indicators of quality. For example, one indicator could specify that the database consists of raw experimental data obtained using Good Laboratory Practices. Another could inform the user that the data were extracted from peer-reviewed journals by a panel of experts. Other indicators could address breadth of subject coverage, completeness,'relevance, and timeliness. Yet another could alert the user that the data were provided by the manufacturer of a particular chemical, and were not scientifically peer-reviewed. Finally, data from some sources are not well characterized at all.

Recommendation 1.5

NLM should include quality indicators and/or descriptors suitable for characterizing the sources of the contents of the databases available on its systems. This would include both databases produced by the NLM and, so far as possible, the offerings of other database producers distributing information via the NLM system. NLM should take a leadership role in encouraging other database producers to adopt quality indicators. Where such quality indicators do not exist, NLM should attempt to establish indicators for NLM databases, and should make every effort to encourage adoption of successful indicators by other database producers.